

new species among this family, and I do not believe that over four* different kinds are to be found in this upper country.

j. Salvelinus malma.

Bull Trout, Cœur d'Alene Lake, August 5. Belly silver white; back and upper parts grayish, spotted with round pink markings; head darker than the back, which seems to be bluish black.

A REVIEW OF THE GENERA AND SPECIES OF THE FAMILY CENTRARCHIDÆ, WITH A DESCRIPTION OF ONE NEW SPECIES.

By CHARLES L. MCKAY.

The object of this paper is to give a catalogue of the genera and species of Centrarchidæ recognized by me, in anticipation of a monographic review of the family which I hope to publish at some future time. The results here obtained are based on a study of all the specimens of Centrarchidæ in the United States National Museum and in the collection of Professor Jordan. Types of nearly all the nominal species thus far described have been examined and compared, and I believe that very few of those here mentioned will prove invalid. The species not examined by me are designated by a star (*).

1. Genus CENTRARCHUS C. & V.

1. *Centrarchus macropterus* (Lac.) Jor. = *C. irideus* C. & V.

The characters assumed to distinguish *C. macropterus* and *C. irideus* disappear on examination of a large series.

2. Genus POMOXYS Rafinesque.

2. *Pomoxys sparoides* (Lac.) Girard. = *Centrarchus hexacanthus* Cuv. & Val.

3. *Pomoxys annularis* Raf.

3. Genus ARCHOPLITES Gill.

4. *Archoplites interruptus* (Grd.) Gill.

4. Genus AMBLOPLITES Rafinesque.

5. *Ambloplites rupestris* (Raf.) Gill. = ? *A. cavifrons* Cope.

5. Genus ACANTHARCHUS Gill.

6. *Acantharchus pomctis* (Baird) Gill.

* *Oncorhynchus chouicha*; *O. nerka*; *Salmo purpuratus*; *Salvelinus malma*. *Salmo irideus* does not range so far to the northward, and *Salmo gairdneri* and the three other species of *Oncorhynchus* (*keta kisutch*, *gorbuscha*), do not ascend so far from the sea.—D. S. J.

6. Genus CHÆNOBRYTTUS Gill.

7. *Chænobryttus gulosus* (C. & V.) Jor. = *Centrarchus viridis* C. & V.; *Chænobryttus viridis* Jor.; *Lepomis gilli* Cope; *Calliurus florideus* Holbr.

8. *Chænobryttus antistius* McKay, nom. sp. nov. = *Glossoplites melanops* Jor. Man. Vert. ed. i, p. 317, and *Chænobryttus gulosus* Jor., Ann. Lyc. Nat. Hist. 1876.

This species is best distinguished from the preceding by the position of the dorsal, the first spine being situated over the posterior margin of the opercular lobe, while in *C. gulosus* the first spine is situated directly over the posterior portion of the base of the pectorals. The only specimens of this species known to me are in the collection of Professor Jordan. The types are from Lake Michigan. There are smaller specimens in the collection from the Upper Wabash and the Illinois Rivers. I have examined specimens of *C. gulosus*, which is a southern form, in the National Museum, from each of the Southern States, from Texas to Virginia.

7. Genus LEPOMIS Rafinesque.

This genus, as understood by me, includes *Apomotis*, *Xenotis*, *Bryttus*, *Helioperea*, *Xystroplites*, and *Eupomotis* of authors. *Apomotis* has been separated from *Lepomis* on account of the large size of the supplemental maxillary. On careful comparison this is found to be scarcely larger than in one or two other species of *Lepomis*. It disappears by degrees, but seems to exist in all the species, though sometimes so small as to be inappreciable. I have even found it present in large specimens of *L. pallidus*. Its presence in the species is only a character of degree, therefore not generic. Till the group had been more fully studied, *Xenotis* was supposed to contain a large number of species, and was separated from *Lepomis* principally for convenience' sake, and on the slight character of the feeble gill-rakers. By the comparison of a very large series of the alleged species from Professor Jordan's collection I have come to the conclusion that they are all forms of a single species. The gill-rakers are usually rather more feeble than in the rest of the species of *Lepomis*, but this again is a question of degree. *Bryttus* has been distinguished from *Lepomis* by the presence of palatine teeth. This is also a character of degree, and is subject to the most perfect gradation. I have found it impossible to retain *Xystroplites* and *Eupomotis* also, as there is complete gradation in the character of the pharyngeals between *Lepomis* proper and *Xystroplites*, and again between *Xystroplites* and *Eupomotis* both as to the width and form of the bones themselves and the form of the teeth.

9. *Lepomis cyanellus* Raf.

10. *Lepomis symmetricus** Forbes, MSS. (in Jordan & Gilbert's Synopsis Fishes N. A. incl.).

11. *Lepomis phenax* (Cope & Jor.) McKay.

12. *Lepomis murinus* (Grd.) McKay.

Some of the types of *Calliurus murinus* Grd. belong to *L. cyanellus*, but the specimen figured by him in the U. S. P. R. R. Exp., x, pl. vii, Fig.

1, belongs to a different species, apparently distinct from all others known. Type B. & G. No. 415, U. S. Nat. Mus.

13. *Lepomis lirus* * McKay, nom. sp. nov. = *Pomotis pallidus* Ag. Not *Labras pallidus* Mitch. Not *Eupomotis pallidus* Jor. which is *Lepomus notatus*. According to Professor Bliss (in letter to Professor Jordan), the pharyngeal teeth of this species are paved.

14. *Lepomis ischyurus* Jordan & Nelson.

15. *Lepomis macrochirus* Raf.

16. *Lepomis punctatus* (C. & V.) Jor. = *L. apiatus* Cope.

17. *Lepomis miniatus* Jordan.

18. *Lepomis humilis* (Grd.) Cop e. = *L. anagallinus* Cope. Type No. 420, U. S. Nat. Mus. From Brazos R., Tex.

19. *Lepomis auritus* (L.) Raf.

19. a *Lepomis auritus* var. *solis* (C. & V.) McKay = *Lepomis rubricauda* Holbr.

The variety is the southern form, and is distinguished from the northern by having larger scales on the cheeks (usually 7 rows instead of 8) and in front of the pectorals, and usually a dark blotch on posterior margin of dorsal.

20. *Lepomis megalotis* (Raf.) Cope. = *Pomotis inscriptus* Ag.; *Lepomis peltastes* Cope.; *Xenotis aureolus* Jor.; *Xenotis solis* Gill & Jor.; *Xenotis lythrochloris* Jor.; *Ichthidis auritus* Raf.; *Pomotis sanguinolentus* Ag.; *Pomotis nitidus* Kirtland; *Pomotis popeii* Grd.; *Pomotis fallax* B. & G.; *Pomotis brericeps* B. & G.

21. *Lepomis marginatus* * (Holbr.) McKay.

22. *Lepomis elongatus* * (Holbr.) Gill & Jor.

23. *Lepomis pallidus* (Mitch.) Gill & Jor. = *Lepomis obscurus* (Ag.) Jor.

24. *Lepomis bombifrons* * (Ag.) Jor.

25. *Lepomis heros* (B. & G.) McKay = *Xystroplites heros*, Jor.

26. *Lepomis albulus* (Grd.) McKay.

The types of this species have been recently found and are identical with *Xystroplites gilli* Jor. Type No. 421, U. S. Nat. Mus. Rio Blanco, Tex.

27. *Lepomis euryorus* McKay. Sp. nov.

Body very robust, compressed. Form nearly oval; dorsal outline more convex than ventral. Antedorsal outline rather steep, slightly convex. Profile slightly depressed above eye. Mouth quite oblique, rather small; maxillary reaching to front margin of eye. Outer row of teeth on both jaws much stronger than the others. Teeth on vomer and front portion of palatines. Lower pharyngeals with the rather long posterior spur turned up; stoutish, the inner angle rounded, somewhat obtuse. Teeth stout, very much blunted, not close set; the inner considerably stronger and less blunt than the rest. The characters of the pharyngeals are those ascribed by Professor Jordan to the genus *Xystroplites*. Gill-rakers short, stout, nearly terete, about eight in number,

the inner surface roughened, scarcely dentate. Branchiostegals six. Maxillary with a small but perfectly distinct supplemental bone. Eye very small, considerably less than length of snout (perhaps an individual character). Nostrils in line with pupil. Preorbital quadrate, mostly below line of pupil; preoperculum moderately large, lower angle rounded, very slightly obtuse. Scales on cheeks moderate, in six to seven rows. Opercle rather large, triangular, with the posterior angle produced into a rounded bony flap, nearly equaling the snout in length. The flap is of a shiny black color as in *L. cyanellus*, surrounded by a very broad membranous margin, which is white in the alcoholic specimen. Scales on the opercle large, in five rows. Suboperculum of nearly the same width throughout, with a single row of scales. Interoperculum wider than suboperculum, with about a row and a half of scales. Scales continued upwards a short distance between opercle and preopercle. Spine of the premaxillary stout and broad; width at base equal to one-third of interorbital space, moderately long, reaching to posterior nostril. Mucous channel from eye to suprascapular bone extremely narrow, scarcely separating the scales. Scales moderately large, ctenoid. Dorsal beginning over base of pectorals. Dorsal and anal somewhat obliquely opposed. Spinous portion of dorsal fin low, the longest spine reaching very little past margin of eye. Spines not very stout, nearly straight; all but the first two of nearly the same height. Soft portion of dorsal much higher than spinous, reaching greatest height at seventh and eighth rays, behind which it descends abruptly. Both caudal peduncle and fin short and stout. Soft portion of anal rounded. Insertion of ventrals behind base of pectorals, not reaching beyond vent. Pectorals short, only reaching vent. Scales in front of pectorals not much reduced, considerably larger than those on cheeks. The description of the species is taken from a single specimen, No. 4109, in the United States National Museum, from Fort Gratiot, Michigan, at the foot of Lake Huron.

Table of Measurements.

Species: *Lepomis curyorus*.

Current number of specimen	4109.		
Locality	Fort Gratiot, Michigan.		
	Dimensions.	Inches and 100ths.	100ths of length.
Extreme length.....		6 $\frac{64}{100}$	
Body:			
Greatest height.....			43
Greatest width.....			16 $\frac{1}{2}$
Least height of tail.....			12 $\frac{1}{2}$
Length of caudal peduncle.....			13 $\frac{1}{2}$
Head:			
Greatest length without ear-flap.....			27 $\frac{3}{4}$
Distance from snout to nape.....			13
Greatest width.....			16
Width of interorbital area.....			10 $\frac{1}{2}$
Length of snout.....			9
Length of ear-flap.....			8
Length of maxillary.....			12

Table of measurements—Continued.

Dimensions.	Inches and 100ths.	100ths of length.
Head :		
Length of mandible		12 $\frac{3}{4}$
Diameter of orbit		6
Dorsal (spinous):		
Distance from snout		36
Length of base		26
Greatest height at fifth spine		9 $\frac{1}{2}$
Height at first spine		3 $\frac{3}{8}$
Dorsal (soft):		
Length of base		17 $\frac{3}{8}$
Height at antecedent spine		8 $\frac{1}{2}$
Height at longest ray (the seventh)		17
Anal:		
Distance from snout		57
Length of base		20
Height at first spine		4 $\frac{1}{2}$
Height at third spine		10
Height at longest ray (the fifth)		14 $\frac{1}{2}$
Caudal:		
Length of external rays		16
Pectoral:		
Distance from snout		31
Length		20 $\frac{1}{2}$
Ventral:		
Distance from snout		38 $\frac{1}{2}$
Length		17
Branchiostegals		6
Dorsal	X, 11	
Anal	III, 10	
Number of scales in lateral line		43
Number of transverse rows above lateral line		6
Number of transverse rows below lateral line	14-15	

28. *Lepomis gibbosus* (L.) McKay.

In the little-known eleventh or Halle edition of the *Systema Naturæ* of Linnaeus, occur the following descriptions :

“*Labrus auritus*. L. cauda bifida, operculis branchiarum pinniformibus. D. $\frac{10}{21}$. P. 15. V. 6. A. 13. C. 17. *Habitat in Philadelphia. Mus. De Geer.*” (p. 283.)

“*Perca gibbosa*. P. pinnis dorsalibus unitis, cauda bifida, abdomine luteo, operculo striatis, apice nigro fulvoque. *Catesb. car.* 2. p. 8. t. 8. f. 3. *Perca fluviatilis gibbosa*, ventre luteo. *Habitat in America.*” (p. 293.)

The description of *Perca gibbosa* refers of course to *Eupomotis aurea*, of authors, and the specific name of *gibbosus* must supersede *aureus* Walbaum 1792. In his twelfth edition Linnaeus suppressed his *Perca gibbosa*, and referred Catesby's figure of *Perca fluviatilis gibbosa* with doubt, to the *Labrus auritus*. The description in the twelfth edition, as Professor Gill has shown, can refer only to *L. auritus*. The specific

name, *gibbosus*, therefore, should be applied to *Eupomotis aureus* of authors, and *auritus* to the northern form of the other species.

29. *Lepomis holbrooki* (C. & V.) McKay = *Pomotis speciosus* Holbr.

30. *Lepomis notatus* (Ag.) McKay = *Eupomotis pallidus* Gill & Jordan.

Professor Jordan has received from the Museum of Comparative Zoölogy some of Agassiz's types of *Pomotis notatus*, which species proves on examination to be identical with *Eupomotis pallidus*, Gill & Jordan.

8. Genus MESOGONISTIUS Gill.

31. *Mesogonistius chætoodon* (Baird) Gill.

9. Genus ENNEACANTHUS Gill.

This genus, as understood by me, includes *Hemioplites* and *Copelandia*. The genus *Hemioplites* was based by Cope on the presence of eight spines in the dorsal fin and four in the anal. I learn from Professor Jordan's notes that Cope's original type of *Hemioplites simulans* has really nine spines in the dorsal. Dr. Edward J. Nolan, who has recently examined the specimen, also informs me that there are nine spines in the dorsal. In a collection of young specimens of *Enneacanthus margarotis* from Virginia, which I have examined in the National Museum, there were several specimens with the fin formula D. 9, A. 4, several with the formula D. 10, A. 4, and the remainder with the formula D. 9, A. 3. That is, some of these specimens, all collected at the same time, and evidently of the same species, were *Enneacanthus margarotis*, others were *Hemioplites simulans*, and the remainder would represent a second species of *Copelandia*.

In 120 specimens of *Enneacanthus margarotis* examined by me, the results were as follows:

13 specimens with D. 8, A. 3.

89 specimens with D. 9, A. 3.

9 specimens with D. 10, A. 3.

5 specimens with D. 10, A. 4.

4 specimens with D. 9, A. 4.

In the examination of 53 specimens of *Enneacanthus obesus* the following results were obtained:

4 specimens with D. 8, A. 3.

46 specimens with D. 9, A. 3.

2 specimens with D. 10, A. 3.

1 specimen with D. 10, A. 4.

In view of these facts, I include *Hemioplites* and *Copelandia* under *Enneacanthus*.

32. *Enneacanthus simulans* (Cope) McKay = *Enneacanthus margarotis* Gill & Jor.; *Hemioplites simulans* Cope; *Enneacanthus pinniger* Gill & Jor.

Having examined the types of *Enneacanthus pinniger*, and compared them with large-finned males of *Enneacanthus margarotis*, I am unable

to find specific differences. They are probably specimens which have developed under more favorable circumstances than are usually accorded to the species.

33. *Enneacanthus obesus* (Grd.) Gill.
 34. *Enneacanthus gloriosus** (Holbr.) Jor.
 35. *Enneacanthus eriarchus* (Jor.) McKay,

10. Genus MICROPTERUS Lacépède.

36. *Micropterus salmoides* (Lac.) Henshall in "Book of the Black Bass" (advance sheets) = *Micropterus pallidus* Gill & Jor.
 37. *Micropterus dolomieu* Lacépède = *Micropterus salmoides* Gill.

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A REVIEW OF THE GENUS CENTURUS, SWAINSON.

By ROBERT RIDGWAY.

INTRODUCTION.

The collection of the United States National Museum contains examples of all the known species of the genus *Centurus*, excepting *C. hypopolius* (Wagl.), *C. rubriventris* Swains., and *C. terricolor* Berlepsch, the two latter being of some what doubtful status. More or less confusion has hitherto existed regarding the nomenclature of several of the Middle American forms, and it was the desire to clear away as much of this confusion as possible that prompted the investigations upon which this review is based, and which have led to the discovery of relationships which were before quite unsuspected, at least by the writer.

Of the fourteen forms treated of in this paper as sufficiently distinct for definition, not more than six, or less than one-half, can be said to be perfectly isolated, or to possess the requirements of perfectly distinct species; at least the abundant material which has been examined in this connection proves beyond question the intergradation of four so-called species, while it suggests more or less strongly the probability or possibility of such relationship with regard to five of the remaining ten. Those which appear to be unquestionably distinct are the three West Indian species, *C. radiolatus* (Wagl.), *C. superciliaris* (Temm.), and *C. striatus* (Müll.), and three continental species, *C. uropygialis*, Baird, *C. hypopolius* (Wagl.), and *C. elegans* (Swains.). Those which certainly intergrade, and are therefore to be united under one specific designation, are *C. aurifrons* (Wagl.), *C. santaeruzi* Bp., *C. dubius* (Cabot), and *C. hoffmanni*, Caban., all of which are, however, strongly characterized geographical races or sub-species. The five forms of doubtful relationship are (1) *C. carolinus* (Linn.), which may possibly grade into *C. rubriventris*, but which is probably distinct; (2) *C. rubriventris* (Sw.), with which I